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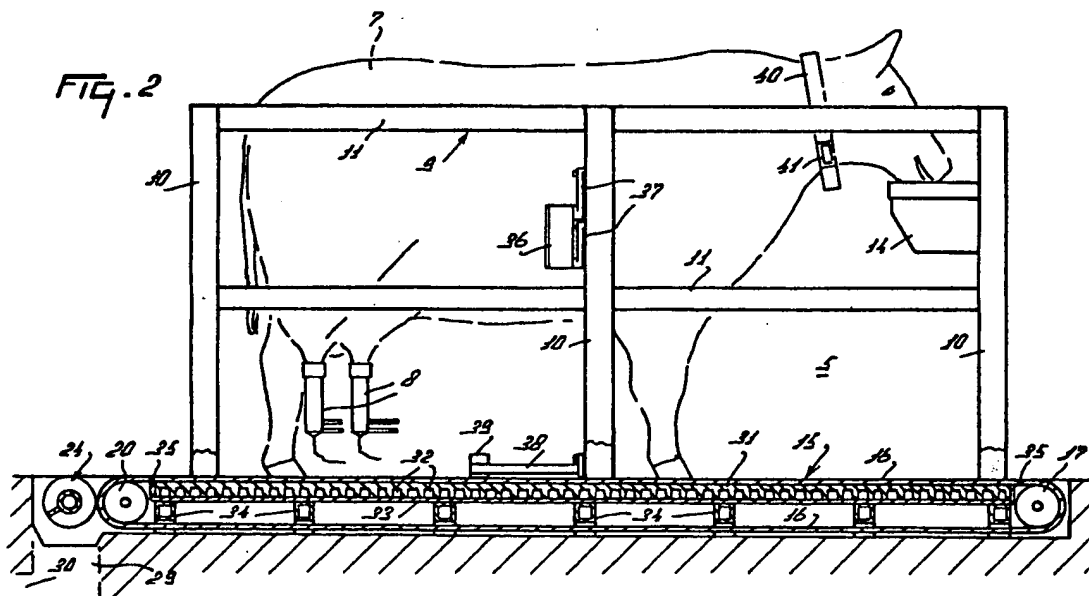
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(54) A construction including an implement for milking animals

(57) The invention relates to a construction including an implement for milking animals, such as cows, provided with a milk box (2). In the milk box (2) the floor (15) is designed as a flexible conveyer (16), below which there is disposed a flexible floor (31) supported against a metal plate (33). The floor (31), provided with recesses (32) at the underside, is relatively flexible. In the milk box (2) there is furthermore provided a trough (14) including a mixing device, by means of which a lure

substance, such as treacle, can be added to the concentrate. Moreover, the milk box (2) is provided with a medical instrument (36), by means of which the blood pressure, the heartbeat, the temperature, etc. of an animal in the milk box (2) can be determined. In addition, the milk box (2) is provided with a sensor, by means of which the physical state of the animal's legs can be determined.



## Description

The invention relates to a construction including an implement for milking animals, such as cows, provided with a milk box.

Such constructions are known. Cows do however not always desire to enter the milking box without delay. Therefore, it is of advantage to improve the situations so that the cows can be milked without problems.

The invention aims at obtaining an improved construction in which drawbacks do not occur or at least are limited to a considerable extent.

According to the invention, this will be achieved by providing the construction with means encouraging the cow to enter the milk box, while at the same time the floor of the milk box is provided with means supporting a pleasant stay of the cow in the milk box, so as to promote the milk production of the animal. In an embodiment according to the invention, the means comprise a floor including a flexible floor made of rubber or synthetic material and further lure means for making the animal enter the milk box. In a preferred embodiment according to the invention, the flexible floor is made of rubber or synthetic material and is provided at the underside with recesses. The recesses in the flexible floor procure a relative elasticity so that, when an animal puts its legs on the flexible floor, a large part of the forces that would be exercised otherwise on the joints of the legs and hips of the animal, are absorbed by the flexible floor. Furthermore, such a flexible floor also has an insulation function so that coldness of the soil is transferred less quickly to the legs. For the purpose of supporting the flexible floor sufficiently, the latter, according to a further inventive feature, is preferably supported by a metal plate. In order to prevent the flexible floor from moving relative to the floor, according to again an other inventive feature the flexible floor is disposed in a frame attached to the floor of the milk box.

For the purpose of preventing the animals from staying away from the milk box because the latter is contaminated by e.g. dung or mud, according to an inventive feature the milk box comprises a floor of which at least part of the surface is movable horizontally and downwardly. Therefore, the invention also relates to a construction including an implement for milking animals, such as cows, provided with a milk box, characterized in that the milk box comprises a floor of which at least part of the surface is movable horizontally and downwardly. According to an inventive feature, the movable part of the floor comprises a flexible, motor drivable conveyer. In a preferred embodiment according to the invention, the conveyer extends over the entire length and width of the milk box. After an animal has left the milk box, which can be ascertained e.g. by means of the cow identification system, according to a further inventive feature, the floor surface is moved so that the next animal to occupy the milk box will always avail of a clean floor. According to a further inventive feature, contaminations that might be present on the movable floor, such as dung, urine,

mud, etc., are collected in a drain provided at one end of the movable floor. For the purpose of removing also contaminations that are relatively difficultly removable from the floor surface, according to a further inventive feature, near the end where the drain is situated, there is provided a scraper for removing the contaminations from the floor surface. In a preferred embodiment according to the invention, the scraper is designed as a motor drivable auger.

According to a further inventive feature, the lure means comprise a drinking trough, which, according to a further inventive feature, is provided with a mixing device by means of which e.g. treacle can be added to the drinking-water. According to again a further inventive feature, the lure means comprise a fodder trough including a mixing device by means of which a substance, such as treacle, can be added to the concentrate.

For the purpose of rendering the animal's stay in the milk box more pleasant, according to an other inventive feature, the lure means comprise a spraying device by means of which warm water is sprayed against the animal's legs. After the animal's legs have been cleaned by means of the spraying device, according to an other inventive feature, the legs are dried with the aid of a ventilator blowing warm air thereagainst. As it has appeared in practice, this is experienced by the animals as very pleasant and enables a very hygienic way of working in the milk box which, finally, has a positive influence on the quality of the milk and the health of the animals.

According to again an other inventive feature, on or near the milk box there is provided a ventilator, by means of which an air current is blown towards an animal in the milk box. According to an other inventive feature, there is blown an air current along the animal's back. It has appeared that the latter measure helps to prevent flies and other vermin from coming near the animal. According to again an other inventive feature, an air current is blown against the animal's udder. In particular when the air current has been warmed up, this is experienced by the animal as pleasant. According to the invention, the warming up of air can be realized by a heating element pertaining to the implement.

In a preferred embodiment according to the invention, the implement comprises a supply channel through which there can be supplied clean, fresh air from outside a stable or cowshed in which the implement is located, to the ventilator. In this way, milking can take place under very hygienic conditions which, finally, may result in a better milk quality. According to the invention, the vermin present on or near an animal may also be controlled by means of an implement for treating an animal with an insecticide and/or skin care means.

In a preferred embodiment according to the invention, the implement for treating the animal comprises a spraying device disposed on or near the milk box. According to a further inventive feature, the implement for treating an animal comprises registration means by

means of which there is recorded which animal has been treated with the insecticide and/or skin care means and which animal, on the basis of these data, will be treated again. In this manner there will be realized a selective treatment of the animals by means of the insecticide and/or skin care means. In a preferred embodiment according to the invention, an animal is treated with the insecticide and/or skin care means prior to being milked in the milk box. Consequently, the animal will behave calmer in the milk box, which will simplify the connection of the teat cups to the animal's teats. It will be obvious that the above-mentioned implement for treating the animal with an insecticide is adapted to be applied together with the above-mentioned ventilator as well as separately. In the case that both implements are applied together, it is advantageous to bring the insecticide and/or skin care means in the air current of the ventilator by means of the above-described implement.

According to an other inventive feature, the construction comprises one or more sensors for the purpose of determining the animal's behaviour in a milk box. According to a further inventive feature, the sensors are provided on the milk box. According to an other inventive feature, the sensor includes an activity meter by means of which e.g. heat of the cow can be ascertained.

In a preferred embodiment according to the invention, the milk box comprises a medical instrument adapted to be folded in, by means of which the heartbeat, the temperature, the blood pressure, etc. of an animal can be measured in the milk box and supplied to a computer. With the aid of the aforementioned parameters, the physical state of each animal can be kept up to date in the computer. When a parameter measured by the medical instrument deviates from an average value inputted in the computer for the aforementioned parameters, then the farmer's attention is drawn thereto by means of e.g. a print-out of the computer. A deviation from the above-mentioned parameters can be an indication for the farmer that an animal is ill or on heat.

According to an inventive feature, the sucking, rest and beat proportion in a pulsation space of a teat holder is adapted by means of a controlled pulsator on the basis of the heartbeat frequency supplied by the medical instrument.

Therefore, the invention also relates to a construction including an implement for milking animals, such as cows, provided with a milk box, characterized in that the sucking, rest and beat proportion in a pulsation space of a teat holder is adapted by means of a controlled pulsator on the basis of the heartbeat frequency supplied by the medical instrument. In this manner, the blood circulation of the teats and the possible damage of the tissue in the teats due to the pulsation of the teat lining can be taken into account. In an embodiment according to the invention, the medical instrument ascertains, on the basis of the heartbeat frequency, when the blood in the teat is circulated, whereafter the controlled pulsator

removes the vacuum in the pulsation space of the teat holder. In a preferred embodiment according to the invention, immediately after the medical instrument has ascertained that the blood circulation in the teat is highest, the vacuum in the pulsation space of the teat holder is removed by the controlled pulsator. According to a further inventive feature, the medical instrument includes a sensor which, after an animal has occupied the milk box, is applied against the animal's udder, so that the heartbeat frequency can be read.

According to again an other inventive feature, the milk box comprises one or more sensors, by means of which the physical state of the animal's legs is determined. The sensor may be designed as a temperature meter, an ultrasound scan, an X-ray machine, etc. Therefore, the invention furthermore relates to a construction including an implement for milking animals, such as cows, provided with a milk box, characterized in that the implement comprises one or more sensors provided on the milk boxes, by means of which the physical state of the animal's legs is determined. The signals supplied by the sensors are processed in the computer and compared with a threshold value inputted beforehand. When the threshold value is exceeded, then the farmer's attention is drawn to the fact that with a specific animal there has been ascertained a defect of the legs.

According to a further inventive feature, the implement includes a milking robot for automatically connecting the teat cups to the teats of an animal to be milked in the milk box. According to again an other inventive feature, the implement comprises a stable or cowshed including a number of cubicles provided with flexible floors.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 shows, in plan view, a construction including an implement for milking animals, provided with a milk box;

Figure 2 shows a side view of the milk box in Figure 1;

Figure 3 shows a plan view of the milk box according to Figure 2;

Figure 4 is an enlarged view of a detail of the floor of the milk box according to Figure 2;

Figure 5 is an enlarged view of a couple of cubicles according to Figure 1, provided with a flexible floor;

Figure 6 shows a rear view of the flexible floors according to the line VI - VI in Figure 5, and

Figure 7 is an enlarged view of a detail of the fastening of the flexible floors in the cubicles.

Figure 1 shows, in plan view, a construction including an implement for milking animals provided with a stable or cowshed 1, entrance doors 2, a feed alley 3 and, on both sides, a row of cubicles 4. In the cowshed 1, there is provided at one end, near an entrance door

2, a milk box 5 in which there is schematically indicated a milking robot 6 by means of which the teat cups can be connected automatically, in a usual manner, to the teats of an animal to be milked.

Figure 2 shows, in side view, the milk box 5 according to Figure 1, occupied by a cow 7 whose teats are connected to the teat cups 8. The milk box 5 comprises a fencing 9 including stands 10 interconnected by means of crossbeams 11. As is shown in Figure 3, the milk box 5 is provided at one longitudinal side with an entrance door 12 and an exit door 13. Moreover, at the front side of the milk box 5 there is provided a trough 14 on a crossbeam of the fencing 9, which trough can be used as a drinking or feeding trough for the animal. In addition, the trough 14 is provided with a (non-shown) mixing device by means of which a lure substance, such as treacle, can be added to the fodder or the drinking-water.

Furthermore, the milk box 5 is provided with a floor 15 comprising a conveyer 16 extending over the entire length and width of the milk box. The conveyer 16 is preferably made of a flexible material, such as synthetic material or rubber. Near the front side of the milk box, the conveyer 16 is disposed about a cylindrical roller element 17, which at both ends is bearing-supported in bearings 18 provided in strips 19. The latter strips are each connected with a foremost stand 10 of the fencing 9 (Figure 3). The cylindrical roller element 17, as is shown in Figures 2 and 3, is disposed outside the milk box 5 and below the level of the floor surface of the milk box 5. At the rear side of the milk box 5, there is also provided a cylindrical roller element 20, which on both sides is bearing-supported in bearings 21 provided in strips 22. The latter strips are connected with the rearmost stands 10 of the fencing 9. The conveyer 16 is also disposed about the rearmost roller element 20, which is motor drivable by means of an electromotor 23 provided on the strip 22.

Near the rearmost roller element 20, there is furthermore provided a scraper 24 for the purpose of removing contaminations that might be present on the conveyer 16, such as dung, mud, etc. The scraper 24 comprises an auger 25, which at its two ends is bearing-supported rotatably in bearings 26 provided in the strips 22. The auger 25 is motor drivable by means of an electromotor 27 provided on a strip 22. The auger 25 is arranged at such a distance from the roller element 20 that the comb 28 of the auger moves just along the surface of the conveyer 16. Below the scraper 24, there is furthermore provided a drain 29 which, via a discharge pipe 30, is in communication with a (non-shown) dung cellar.

In the milk box 5, below the conveyer 16, there is additionally provided a flexible floor 31 made of synthetic material and provided at the underside with U-shaped recesses 32 (Figure 4). It will be obvious that the flexible floor may also be made of an other type of material, such as rubber. The flexible floor 31 is supported against a metal plate 33 supported by box gird-

ers 34. In order to prevent the flexible floor 31 from shifting relative to the metal plate 33, the latter plate is surrounded by a frame 35.

On the middle stand 10 of a longitudinal side of the milk box 5, there is furthermore provided a medical instrument 36, by means of which the heartbeat, the temperature, the blood pressure, etc. of the cow 7 in the milk box 5 can be measured and supplied to a (non-shown) computer. The medical instrument 36 can be pivoted against the body of the cow 7 about a vertical shaft 37 including a (non-shown) cylinder.

On the middle vertical stand 10, near its lower side, there is provided a horizontal strip 38 including at the end a sensor 39 rotatable about a vertical shaft, by means of which the physical state of the animal's legs is determined. The sensor 39 may be designed as an X-ray machine, an infrared camera, an ultrasound scan, etc. The signal supplied by the sensor 39 is processed in the (non-shown) computer. Moreover, the above-described construction comprises a (non-shown) animal identification system by means of which the identity can be established of an animal having occupied the milk box 5. For that purpose each animal is provided with a collar 40 including a transponder 41. By means of the animal identification system, the data supplied by the medical instrument 36 and the sensor 39 and processed in the computer are kept up to date per animal. By means of the animal identification system there is also ascertained whether or not an animal has left the milk box 5, whereafter the computer supplies a signal to the electromotor 23 and 27, so that the conveyer 16 is put into operation and, by means of the scraper 24, contaminations that might be present on the conveyer are removed. In this way, the next animal to enter the milk box 5 will avail of a clean floor.

Moreover, the milk box 5 may be provided with a spraying device by means of which warm water can be sprayed against the animal's legs, as well as with a ventilator by means of which, after the cleaning of the legs has finished, warm air is blown against the animal's legs.

As is shown in Figure 1, the cowshed 1 comprises cubicles 4 on both longitudinal sides. The first row of cubicles 42 is separated from the second row of cubicles 43 by a feed alley 3. At one end of the feed alley 3 there is a passage 44 connecting the first row of cubicles 42 with the second one 43. The passage 44 is provided with computer controlled doors 45. Each of the cubicles 4 includes a flexible floor 46 made of synthetic material or rubber and provided at the lower side with U-shaped recesses 32 (Figure 7). As is shown in Figure 6, near the centre the flexible floors 46 are higher than near the edges. Said flexible floors are supported against a metal plate 47 which is disposed on the floor 49 of the cowshed 1 by means of six wire nails 48 (Figure 5). Furthermore, the flexible floors 46 are glued to the metal plate 47. In addition, between two juxtaposed cubicles 4 there is provided a U-shaped tube 50, which is attached with its end to the wall of the cowshed 1 and

extends approximately until halfway the length of the cubicle 4.

The function of the above-mentioned construction including the implement for milking animals will be explained in what follows.

The cowshed 1 is adapted to accommodate a group of cows and to milk same automatically by means of the milking robot 6. After having taken bulkage from the feed alley 3, the animals wish to ruminate same and then, in general, assume a horizontal position. The cubicles 4 being provided with flexible floors, they constitute ideal places for the cows to retire and ruminate. Lured by the comfort of the cubicles 4, which, for lying down, is more or less comparable to that of a meadow, the animals looking for a place to lie on will rather choose the cubicles 4 than the relatively hard and cold concrete floor of the cowshed 1. A further advantage is that the flexible floors 46 have an insulating function so that little warmth is withdrawn from the animal's body and consequently the risk of getting stiff joints and catching a cold is reduced.

After some time, a large number of the animals present in the cowshed 1, by means of a natural stimulus or habituation, will feel the need to enter the milk box 5 and let themselves be milked automatically by the milking robot 6. After an animal has occupied the milk box 5, there will be supplied concentrate to the animal in the trough 14 by means of a (non-shown) concentrate dosage system. However, it has appeared in practice that, in spite of the fact that there is supplied concentrate to the animals in the milk box 5, a number of animals is less inclined to enter said milk box. For the purpose of luring also these animals to the milk box 5, in the trough 14 there is not only supplied concentrate but, via a (non-shown) mixing device, there is added thereto a lure substance, in the present embodiment constituted by treacle. It has appeared that the animals react very positively thereon and that also animals that did not or not regularly visit the milk box 5, lured by the lure substance, start visiting the milk box 5 more frequently.

Before the animal is milked by means of the milking robot 6, it is identified by a (non-shown) animal identification system by means of the transponder 41. During milking, the heartbeat, the blood pressure and the temperature of the animal are measured by means of the medical instrument 36 and compared with the average value inputted beforehand per animal and per parameter. When one of the aforementioned parameters deviates too much from the average value, this is stated on an attention list, in order to enable the farmer to inspect the animal or to consult the veterinary. Moreover, by means of the sensor 39 the physical state of the animal's legs is measured and, when the latter show a defect, this is also stated on the attention list. After the milking of the animal has finished and the teat cups 8 have been disconnected, the exit door 13 is opened and the animal can leave the milk box 5. Whether or not the animal has left the milk box is ascertained by means of the animal identification system. When the milk box 5 is

empty, the computer supplies a signal to the electromotors 23 and 27, so that the conveyer 16 and the auger 25 are put into operation. Then, the surface of the conveyer 16 is cleaned by means of the auger 25 so that, when another animal occupies the milk box 5, the floor thereof is clean. Due to the fact that below the conveyer 16 there is provided a flexible floor 31, the floor of the milk box 5 is relatively soft. In practice it has appeared that the animals experience this as very pleasant and are more inclined to enter the milk box 5. The risk for the animals of sustaining injuries of their legs in the relatively small space of the milk box 5 is reduced to a considerable extent as a consequence of the relatively soft floor.

The invention is not restricted to the aforementioned description, but also relates to all the details of the drawings.

### Claims

1. A construction including an implement for milking animals, such as cows, provided with a milk box (2), characterized in that the construction comprises means encouraging the cow to enter the milk box (2), while at the same time the floor (15) of the milk box (2) is provided with means supporting a pleasant stay of the cow in the milk box (2).
2. A construction as claimed in claim 1, characterized in that the means comprise a flexible floor (31) of the milk box (2).
3. A construction as claimed in claim 2, characterized in that the floor (15) comprises a flexible floor (31) made of rubber or synthetic material, as well as further lure means to make the animal enter the milk box (2).
4. A construction as claimed in claim 3, characterized in that the flexible floor (31) is provided with hollow spaces (32).
5. A construction as claimed in claim 4, characterized in that the hollow spaces (32) are constituted by recesses at the lower side of the flexible floor (31).
6. A construction as claimed in any one of claims 2 to 5, characterized in that the flexible floor (31) is supported against a preferably metal plate (47).
7. A construction as claimed in any one of claims 2 to 6, characterized in that the flexible floor (31) is disposed in a frame (35) attached to the floor (15) of the milk box (2).
8. A construction as claimed in claim 7, characterized in that the frame (35) is attached to the floor (49) of the milk box (2) by means of wire nails (48).

9. A construction as claimed in any one of the preceding claims, characterized in that the milk box (2) comprises a floor (15) of which at least part of the surface is movable horizontally and downwardly.
10. A construction including an implement for automatically milking animals, such as cows, provided with a milk box (2), characterized in that the milk box (2) comprises a floor (15) of which at least part of the surface is movable horizontally and downwardly.
11. A construction as claimed in claim 9 or 10, characterized in that the movable part of the floor (15) comprises a flexible, motor drivable conveyer (16).
12. A construction as claimed in claim 11, characterized in that the conveyer (16) extends over the entire length and width of the milk box (2).
13. A construction as claimed in any one of claims 9 to 12, characterized in that the floor (15) surface is moved as soon as an animal has left same.
14. A construction as claimed in claim 13, characterized in that the presence or absence of an animal on the floor (15) is ascertained by means of a cow identification system.
15. A construction as claimed in any one of claims 9 to 14, characterized in that at one end of the movable floor (15) there is provided a drain (29), in which there can be collected contaminations, such as dung and urine, that might be present on the movable floor (15).
16. A construction as claimed in claim 15, characterized in that, near the end where the drain (29) is situated, the movable floor (15) is provided with a scraper (24) for the purpose of removing contaminations present on the floor (15).
17. A construction as claimed in claim 16, characterized in that the scraper (24) is designed as a motor drivable auger.
18. A construction as claimed in any one of the preceding claims, characterized in that the lure means comprise a drinking trough (14).
19. A construction as claimed in claim 18, characterized in that the drinking trough (14) comprises a mixing device, by means of which e.g. treacle can be added to the drinking-water.
20. A construction as claimed in any one of the preceding claims, characterized in that the lure means comprise a fodder trough including a mixing device, by means of which a substance, such as treacle, can be added to the concentrate.
21. A construction as claimed in any one of the preceding claims, characterized in that the lure means comprise a spraying device, with the aid of which warm water is sprayed against the animal's legs.
22. A construction as claimed in any one of the preceding claims, characterized in that the lure means comprise a ventilator, by means of which warm air can be blown against the animal's legs.
23. A construction as claimed in any one of the preceding claims, characterized in that the construction comprises one or more sensors for the purpose of determining the animal's behaviour in the milk box.
24. A construction as claimed in claim 23, characterized in that the sensor(s) is/are provided on the milk box (2).
25. A construction as claimed in claim 23 or 24, characterized in that the sensor includes an activity meter.
26. A construction as claimed in any one of claims 23 to 25, characterized in that, by means of the sensor, heat of a cow can be ascertained.
27. A construction as claimed in any one of the preceding claims, characterized in that the milk box comprises a medical instrument (36) adapted to be folded in, by means of which the heartbeat, the temperature, the blood pressure, etc. of an animal can be measured in the milk box (2) and supplied to the computer.
28. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises one or more sensors provided on the milk box (2), by means of which the physical state of the animal's legs is determined.
29. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises a milking robot (6) for automatically connecting teat cups (8) to the teats of an animal to be milked.
30. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises a stable or cowshed (1) including a number of cubicles (4) provided with flexible floors (31).

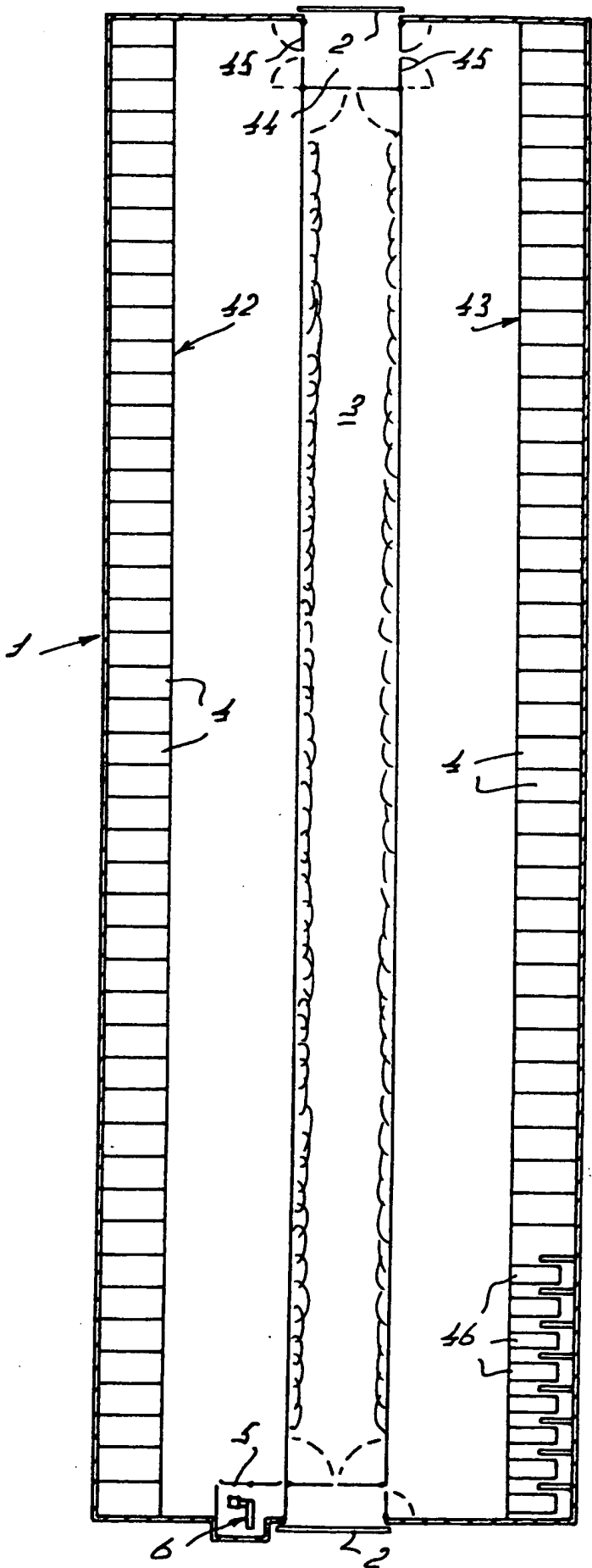
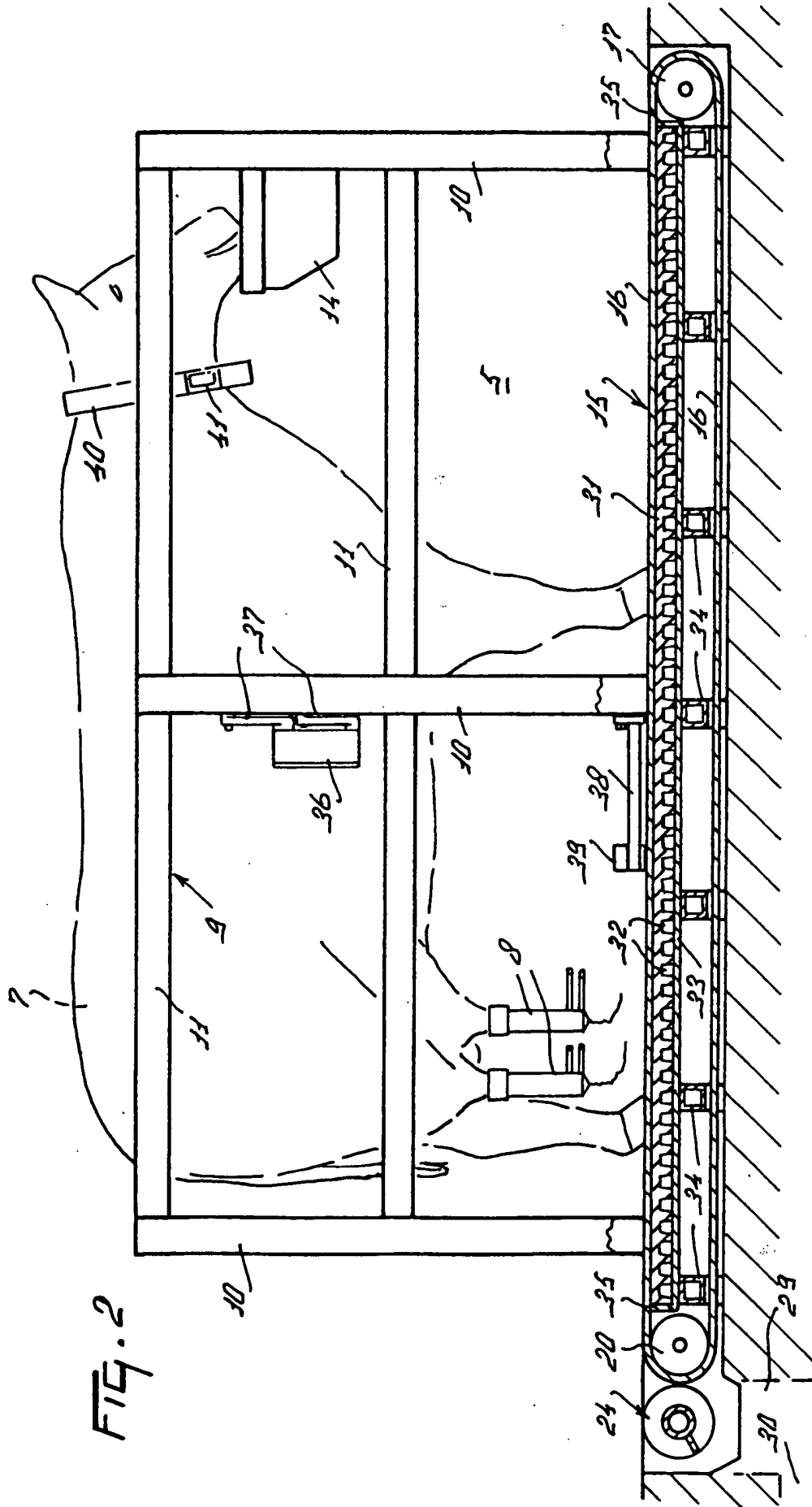
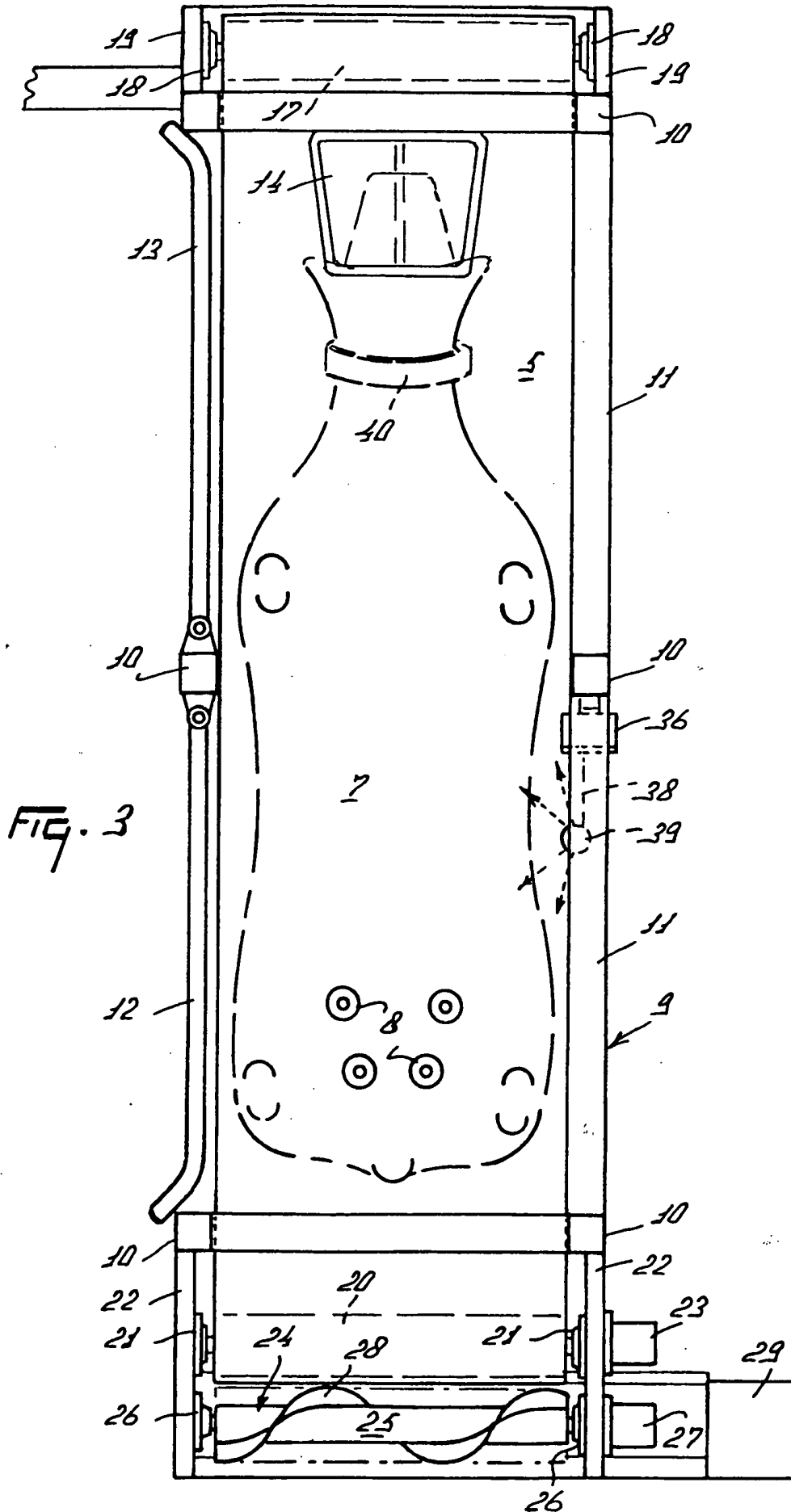


FIG. 1







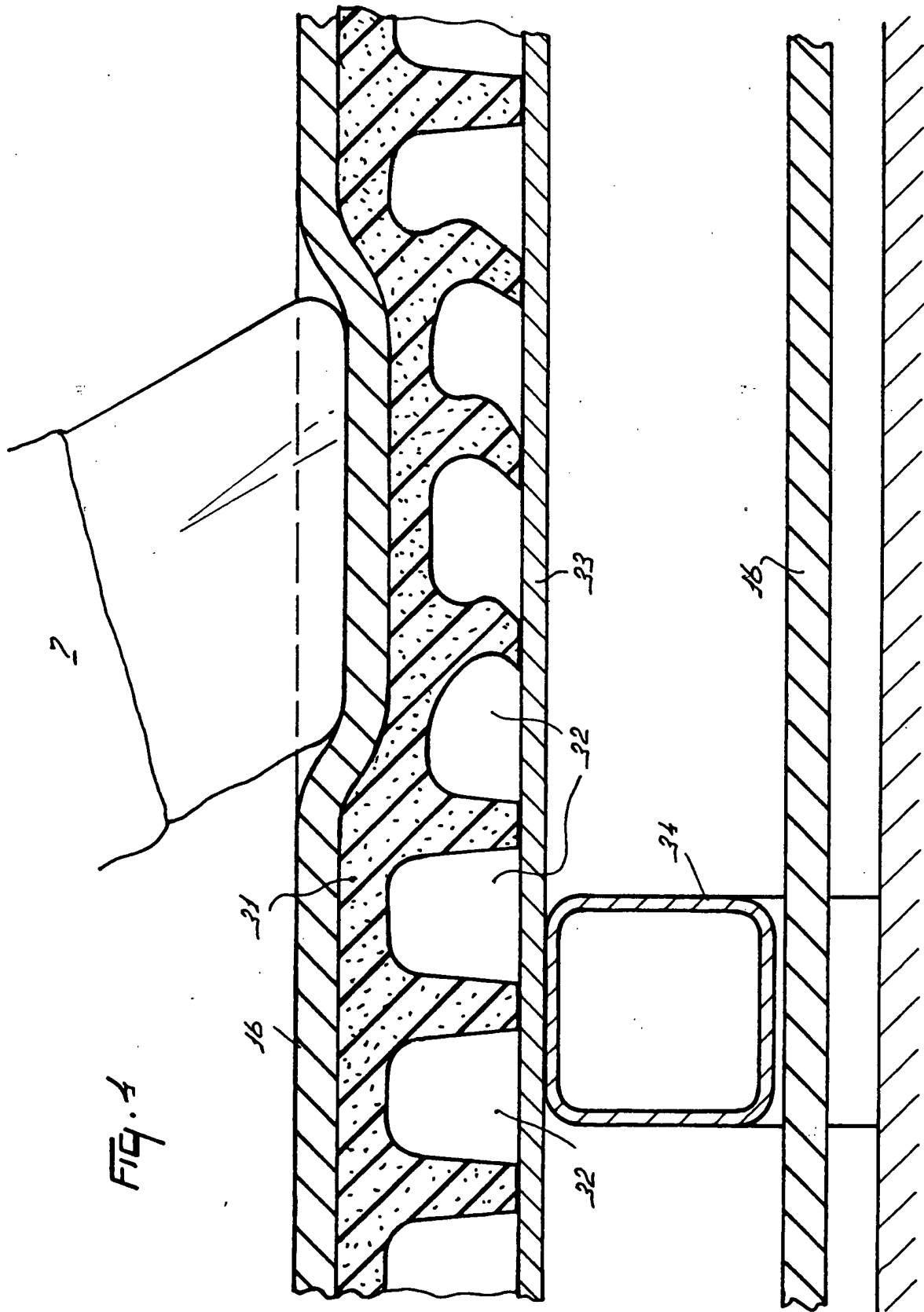
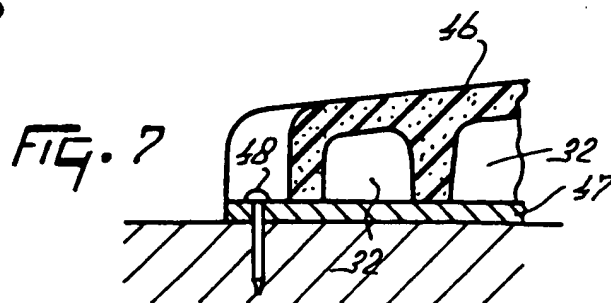
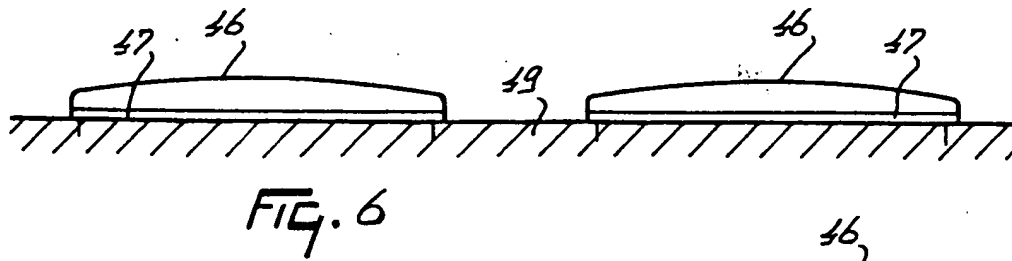
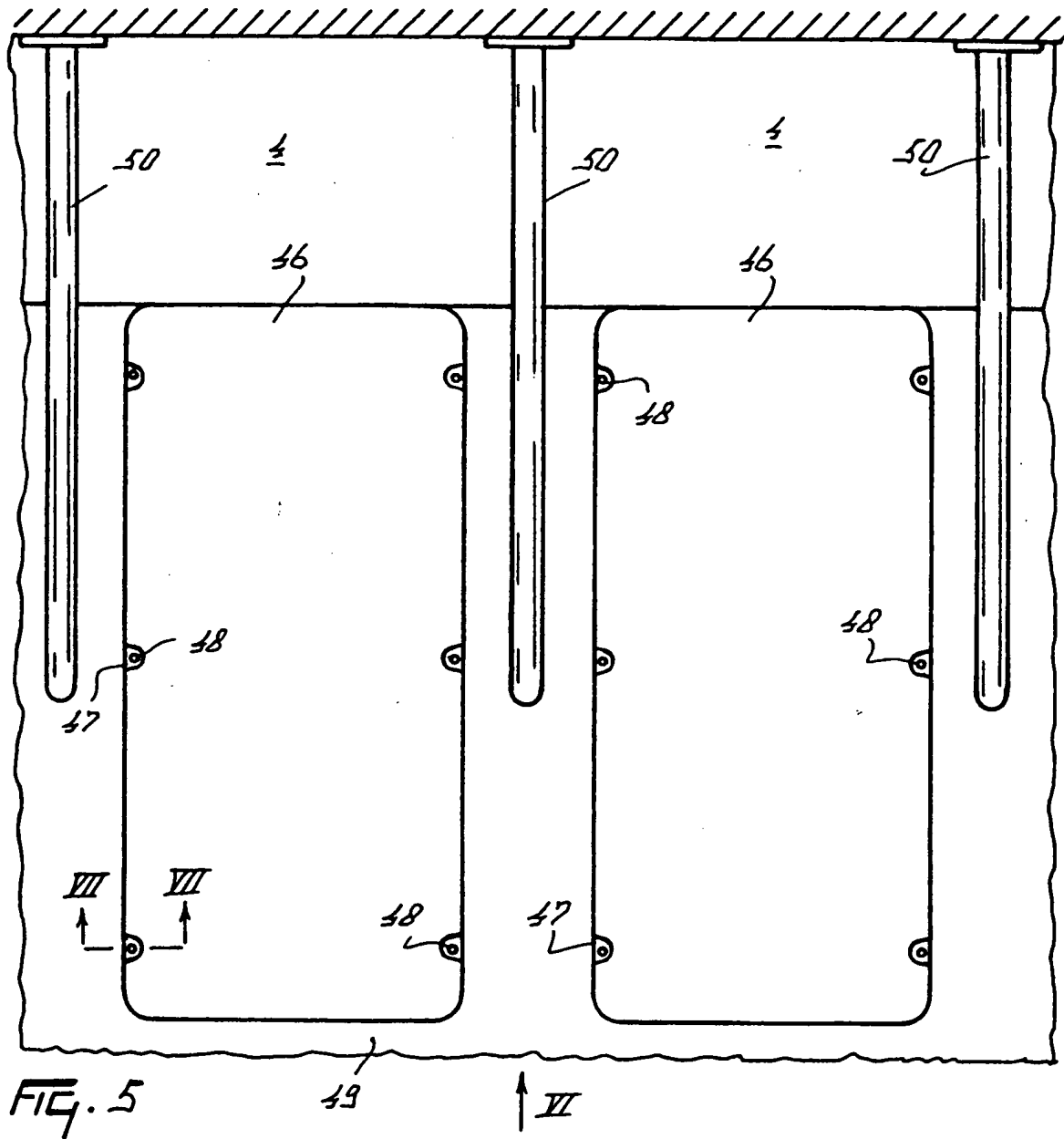


FIG. 4





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# EUROPEAN SEARCH REPORT

Application Number  
EP 96 20 0448

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 194 730 (VAN DER LELY)  * page 3, line 22 - page 4, line 12 * * page 4, line 30 - page 5, line 31 * * page 7, line 23 - line 32 * * figures *	1,3, 9-12,15, 29,30	A01K1/12 A01K1/015 A01K1/01 A01J5/017
X	EP-A-0 567 191 (VAN DER LELY) * column 1, line 51 - column 2, line 12 *	1,20,29 18,19	
A	EP-A-0 595 409 (VAN DER LELY) * claims; figures *	1,23-28	
A	WO-A-94 15452 (DESIGN CONCRETE SYSTEMS LIMITED) * page 1, paragraph 1 * * claims; figures *	1-6	
A	DE-A-17 57 360 (MIELE) * page 2, paragraph 3 * * page 3, paragraph 2 * * page 4, paragraph 3 - page 5, paragraph 2 * * claims; figures *	1,9-16	TECHNICAL FIELDS SEARCHED (Int.Cl.6)  A01K A01J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 April 1996	Examiner Piriou, J-C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			